

## **Hand-utility interface**

### **Technical Field**

The present invention relates to a hand-utility interface that is wearable on the hand of a user. In particular, the present invention relates to a foamed block for receipt of utility or tool attachments, especially attachments suitable for use in cleaning and grooming applications.

### **Background to the invention**

Most of the cleaning tools presently available rely on a user directly holding an independent interface, such as handle of the common bristle brush. In such cases, the user's hand is unprotected whilst conducting the task. Additionally, much of the innate dexterity of the user's hand, in particular, the user's fingers, is lost.

It is an object of the present invention to provide a wearable hand-utility interface, which protects the hand of a user during the undertaking of various utility tasks (e.g. cleaning, grooming).

It is another object of the present invention to provide such a wearable hand-utility interface, which affords the user more of the dexterity of the user's hand, such that the interface can form itself to meet any surface, regardless of its complexity.

It is a further object of the present invention to provide a hand-utility interface, which allows the hand to be clenched, for example, for wringing out liquid from the interface, without causing discomfort to the wearer.

It is a still further object of the invention to provide a hand-utility interface, which is adaptable for use with different sizes of hand and different lengths of finger.

### **Summary of invention**

According to a first aspect of the present invention there is provided a hand-utility interface for use in protecting a user's hand during utility tasks comprising a foamed block body

having a plurality of finger-receiving channels defined therein; and palm support means for securing said interface to the palm of a user's hand, wherein the finger-receiving channels snugly receive the fingers of said user's hand such that in use, the palm support means and finger-receiving channels secure the interface to the user's hand.

The term 'hand-utility interface' (or simply 'interface') herein is used to mean a wearable block body form device or apparatus, which protects at least part of the hand of a user during the undertaking of various utility tasks (e.g. cleaning, grooming). The 'interface' provides an interface between the user's hand and the utility media, which in aspects comprises a utility tool or utility consumable (e.g. cleaning or polishing media) for use in performing a utility task.

In aspects, the hand-utility interface is designed to afford maximum comfort to the hand whilst maximising the work area covered by the hand and the efficiency of the cleaning task.

Suitably, the hand-utility interface is adaptable for use with user's hands of varying sizes.

Typically, the interface acts to at least, part-enclose the user's hand (i.e. at least part of the hand and fingers are not enclosable thereby).

Preferably, the hand-utility interface in use, covers the users' fingers and at least part of the user's palm but leaves the top part of the user's hand and fingers uncovered. This embodiment provides enhanced user utility in terms of ease of hand and finger movements. In one aspect, the hand-utility interface is designed such that it covers only that part of the palm that can be comfortably reached by the fingers. When the interface comprises absorbent media, this provides the function that the interface can be efficiently wrung out by a simple clenching of the fist.

In embodiments, the hand-utility interface herein is also shaped to accommodate its putting on by the user such as in a one-handed operation that enhances ease and speed of user "pick up". This contrasts with the operation to put on most traditional gloves, which is a two handed operation.

The hand-utility interface comprises a block form body. The body has essentially two functions. Firstly, it provides a degree of protection to the user's hand whilst conducting utility tasks. Secondly it provides a support for the application of utility media by the hand.

Suitably, the body provides a support for suitable utility media, but flexes to allow movement of the hand.

Preferably, the body is shaped to provide a uniform, e.g. flat work surface (i.e. utility surface) that typically takes the form of a continuous pad in use, locating under the hand of the user. This contrasts with the non-uniform, rounded form, work surface provided by the un-gloved palm and underside of fingers of a user's hand.

The body is generally comprised of a foamed or sponge-like material. The material suitably comprises a synthetic polymer material that has a foamed structure (i.e. comprising foamed bubble features). In essence, suitable foam materials are those that offer the characteristics of 'sponge' such as its natural give and crushability, resilience and ability to absorb and carry liquid media. Suitable materials include 'open foam', where the individual bubbles are incomplete spheres, and 'closed foam', where the spheres are complete, this latter type having considerably less water absorption ability.

The body has a block form. That is to say, overall it has a generally block-like three-dimensional form. The body has plural (generally, four) finger-receiving channels defined therein. The finger-receiving channels may be provided to the block form body in any suitable manner including cutting out the channels or by injection-moulding the form of the body with the finger-receiving channels defined therein.

In one particular aspect, the block form body is produced by injection moulding using viscoelastic foam (e.g. slow recovery foam). This process is especially suitable for producing a durable product that might have bristles or any other type of cleaning media applied.

In a variation herein, the block form foamed body is injected with viscoelastic foam. This variation allows that the side walls of the finger-receiving channels may in use, close over the top surface of a user's finger a little and significantly aid retention. It also renders the form of the body more flexible still and expandable, so better to deal with a greater variety of hand sizes and give great comfort to the wearer.

The surface of the body that in use, contacts the palm of the user (the 'palm piece') might be flat, or it might be domed better to locate it under the hand for added user comfort.

In one aspect, the 'palm piece' extends back to equal the extent that the fingers of the user's hand reach when closed against the user's palm. This aspect is particularly suitable for versions of the interface designed to enable a wringing out action.

In another aspect, the 'palm piece' is longer and extends further towards the wrist so that it covers the whole of the palm of the user's hand, and potentially extends further still, depending upon the resilience of the foam and its ability effectively to carry media for useful work. This aspect is particularly suitable for versions of the interface that are designed to carry a disposable wipe.

In one aspect, the body is also shaped such that in a line, more or less ahead of the second finger-receiving channel (i.e. that channel that in use, receives the second finger of a user), the form of the body produces a soft 90 degree angle, the lines of which are interrupted by the finger tip protecting ends of the body for the index and third fingers. The purpose is to produce a form that is good at getting into corners, for example where the wipe being used is for window cleaning. In use, the fingertip protecting ends of the body for the index and third fingers are suitably arranged to crush down, so providing, for example, a good form for sweeping a window frame immediately adjacent to the glass.

Depending upon the nature of the selected body, the perimeter (plan view) of the interface may extend out to produce a surface considerably bigger than the hand. To do this and allow that the extreme of the perimeter has sufficient inherent strength to perform useful work may require a more rigid/stiffer foam type.

In one aspect, the block form body is split between the finger-receiving channels to provide that each finger of a user can move independently of the others (i.e. each finger has its own foam channel).

In another aspect, moisture and fluids in general can be prevented from rising up through the foamed block body (e.g. through the open cells of the foam) and reaching the user's hand by

the addition of a waterproof barrier layer to the block form body (e.g. running horizontally through the body).

In a further aspect, in order for the block form body to give the user's hand more protection from the surface being worked upon and to enable the block form body to apply more aggressive work action, one or more rigid layers of material (e.g. in the form of a plate or plates) is provided to the body. In one example, the one or more rigid layers sandwiches between the base of the body and whatever work medium is required.

The block form body is suitably produced by a process known as "deformation cutting" or "form profile cutting", which is a known process of manufacture for three dimensional cutting of block form bodies such as upholstery parts, automobile seat elements, packaging and other profiled parts out of flexible foams. The advantages of using such a process are high speed and economic production.

In the process, the block-forming machine operates according to the compression system using templates (e.g. made out of aluminium). The template has a cavity of the desired shape of the block. The template is screwed onto table of the machine. The foam blank is placed onto the template. By means of a conveyor belt and a pressure roller, the foam blank is pressed into the template's cavity. The pressed foam is cut directly above the template during the automatic forward movement of the table. The cutting tool is a rotating band knife.

In general terms, the deformation cutting process used to produce the foam block cannot produce undercuts. In certain circumstances, it is desirable to have undercuts in the form of tabs that extend from the top of the walls of the finger-receiving channels. In use, these tabs hang over the fingers of the user. Suitably, the user's fingers pass downwards past the tabs and the tabs then assume a position above each finger, thereby assisting retention of the block form body on the user's hand.

If however, the block form body is produced in two parts, split through a line running horizontally at the point where the walls begin to widen towards their base, and if those two parts were then welded together, then the desired over hanging tabs could be provided. Further, the two parts of the block may be produced in materials of differing strengths, thereby giving extra control over its physical characteristics.

In another aspect, suitable over finger tabs are produced by stamp cutting a partially flexible membrane to be welded on top of the walls of the finger-receiving channels and in places protrude/extend out over one or more of the channels. Such a stamp cut membrane would likely be in one single piece, each element connected to the other at the fingertip locations.

Suitably, the hand-utility interface herein is arranged to cooperate with those elements common to all sizes of user hands. It is suitably configured to offer a fit for the majority (e.g. 90%+) of all adult hand sizes. Traditional glove forms account for this variable by offering different sizes of product or by use of stretch fabrics, whereas the present interface does so by providing means for securing the interface to a user's hand.

In aspects, the interface is adapted to have ambidextrous form. That is to say, a universal fit form where it is configured to work for either left or right hand.

The applicant has noted that there can be a problem with an ambidextrous form of the block form body: It is that in use, neither the third or fourth fingers of the user fully reach the end of their respective finger-receiving channels, for either the left or the right hand. In effect, the vacant space in the relevant finger-receiving channel moves from the right hand side of the block form body to the left hand side, depending upon which hand is applied.

By way of a solution, a band (e.g. horseshoe shaped) is provided to the block form body at the tip of each finger-receiving channel. The band is resiliently crushable in form, for example comprising a soft-walled fluid-filled sack, able to be crushed at one point and so expand at another. In use, when a user's hand is inserted the band crushes, thereby resulting in filling up of the otherwise vacant channel space.

Suitably, the natural tapering form of the user's hand / fingers is taken advantage of to provide for universal fit. The natural taper of the hand is present in two planes, namely that present on examination of the hand in plan view and that present in the side elevation.

Each finger-receiving channel is sized and shaped to snugly receive a finger of a user. The snug receipt is assisted by the resilience characteristics of the material comprising the body, which mean that the walls of each finger-receiving channel tend to give as the finger is inserted and naturally adapt to any further finger movement to maintain snug finger-receipt.

In one aspect, the means for securing the interface to a user's hand comprise palm support means for securing said interface to the palm of a user's hand and the finger-receiving channels for snugly receiving the fingers of the user's hand. In use, the palm support means and finger-receiving channels act in combination to secure the interface to the user's hand.

Each finger-receiving channel defines opposing side walls to at least partially encase a snugly received finger. Each side wall may either be a 'divider wall' that acts to divide a particular finger-receiving channel off from its adjacent neighbour(s) or a 'perimeter wall' that in use, locates adjacent to the outside of the first or fourth user fingers. The side walls may provide a finger support function, as a result of their resilient character. The sidewalls may however, also enable (and e.g. be shaped for) in use, grip by the fingers of the user. Thus, for example for any two adjacent finger-receiving channels (e.g. between the first and second, second and third or third and fourth fingers) the user may apply gripping force between his /her relevant fingers to the divider wall between the adjacent finger-receiving channels thereby gripping onto that divider wall.

The finger channels in general, have an elongate 'U' shape. In one, the finger channels are tapered along the channel. This tapering form is designed to assist user insertion of his/her fingers into each channel. In another aspect, the uppermost portion of the 'U' shaped channels closes in a little, better to close over the top part of the finger. Generally, the divider walls only extend back from the finger tip towards the palm so far as is allowed by the junction between fingers of a small, ladies hand.

Generally, the walls of the finger channels need to be sufficiently high that the fingers of the small, ladies hand are completely concealed in side elevation. The wall height is generally also sufficient that at least two thirds of the big male finger depth is concealed in side elevation. Suitably, the walls rise high enough so that the users' fingers may 'crimp together' to grip the walls and so support the entire interface that is under the relevant fingers.

In one variation, the walls of any or each finger channel are higher in one or more places and lower in one or more other places.

In other variations, the walls of any or each finger channel are continuous or alternatively, intermittent.

In a further variation, as an alternative to walls, there might be one or more upright elevations (e.g. stands) of suitable material. These elevations might be of any shape in plan and side view, but are most likely set to avoid abutment of the user's knuckle, in use.

In a further variation, the right and left perimeter walls (i.e. those outer walls of the first and fourth finger channels) extend back further over the palm piece, in order to provide improved lateral stability of the palm piece in use.

In aspects, any or each of the walls of the finger channels are arranged to rise up and return inwards such that on receipt of the users' fingers the tops of the walls partially close over the top of the fingers. The returning inwards action may occur at either one or both sides of the channel. In variations, the upper portion of the channels, as seen in end elevation, return in to partially cover over the upper surface of the finger to a greater or lesser degree.

In one variation, the returning in action is arranged to be constant throughout the whole length of the finger channel. In another variation, this action is intermittent (i.e. appearing in some parts of the finger channel and not in others).

Embodiments are envisaged in which one or more finger-channels are arranged to receive plural, particularly two, fingers of a user. In such embodiments it will be appreciated that the number of walls is necessarily fewer than in the standard four finger, three dividing walls, two perimeter walls embodiment.

In one embodiment, each finger channel is arranged to receive two fingers. That is to say, a first finger channel receives the first and second fingers and a second finger channel receives third and fourth fingers. A single divider wall separates the first and second finger channels.

In another embodiment, one finger channel is arranged to receive two fingers and two finger channels are arranged to receive a single finger. Divider walls separate each of the finger channels from its neighbour(s). Each of the 112, 121 and 211 permutations is envisaged.

In another embodiment, a single finger channel is arranged to receive all four fingers. The single finger channel has perimeter walls but no divider walls are present.



In further embodiments, one or more finger channel divider walls are present together with either one or no perimeter walls.

The applicant has noted that a problem can arise in retaining the block form body to the user's hand and/or fingers, while the fist is clenched.

By way of amelioration of the problem "V" incisions may be provided to the top of the walls of the finger-receiving channels.

Alternatively, the volume of foamed body to be compressed when clenching the fist is reduced by providing depressions along the centre base of each finger-receiving channel.

Alternatively, the volume of foamed body to be compressed when clenching the fist is reduced by providing "V" or "Square" shaped channels, running crosswise (i.e. perpendicular to the finger-receiving channels) in the underside of the base of the block form body (i.e. the working surface). This is achievable by the foamed body blank being run twice through the deformation cutting process. Such incisions might run below the finger channel base line or they might be set to run through the channels.

Alternatively, one or more finger grips may be recessed into the wall of the each finger-receiving channel. Such grips might be injection moulded. Such finger grips might be extended outside any of all of the finger-receiving channels to provide grips to retain wipes. In aspects, such finger grips may partly or wholly replace the need for the use of the yokes, as described hereinafter. With no yokes in place and finger grips in place, a user's hand may simply descend vertically onto and pick up the block form body, making it a true "one-hand" pick up. This vertical descent pick up action is typically different from the pick up action where yokes are employed that typically require a two-handed pick up action because the hand to be associated with the block form body must be slid in laterally, under the yokes.

In a particular aspect, the block form body is arranged for ambidextrous use. That is to say, it is arranged such that it is readily use-able with either the left or right hand of the user. The benefit of ambidextrous product form is that one product meets all needs, so no need to make a choice at the point of sale.

In one form, particularly suitable for ambidextrous use, the block form body has four finger channels, and the two middle channels are produced the same length (i.e. both will accommodate the second longest finger of a user). The two outer finger channels are also produced the same length (i.e. they are both produced long enough to accommodate the index finger of a user). It will be appreciated that in this form, the effect is that, the third and fourth finger channels are longer than need be for both left and right handed users.

Additionally, in forms arranged for ambidextrous use both palm support means (e.g. both yokes) are set at the same distance from the palm. Compare this with for example, a 'right hand only' product where the right yoke is typically set back a little (closer to the palm).

In variations, the one or more walls do not extend sufficiently to provide protection in use, to the user's finger tips. Instead, the base part of the block body of the interface extends forward of the end finger tip position in use, so that the finger tips are "set-back" from harm.

In aspects, finger tip grips are provided, possibly injection moulded, to grip the finger tips of a users' finger, in use.

The palm support means herein functions to support the body (e.g. palm-protecting part) of the interface and to retain it firmly against the underside of the user's hand. In general terms, the purpose of the palm support means is to prevent the body (particularly, the palm piece thereof) drooping down because of its own weight and that of any cleaning media and mopped up liquids thereon.

Suitably, the palm support means secures the body of the interface to the base of the fingers and/or the palm of the user's hand.

Suitably, the palm support means takes the form of one or more resilient yokes. The yokes are shaped for receipt at the junction between the fingers of a user (i.e. at the junction of either the first and second, second and third, or third and fourth fingers).

Suitably, the yokes are shaped to cooperate with the natural taper common to all hands. The resilient nature of the yoke once again affords the glove to accommodate and adjust to various hand sizes.

Suitably, the one or more yokes have a T-form. In particular, each yoke comprises a vertical trunk with horizontally extended arms and legs. In use, the T-form yoke fits between a user's adjacent fingers.

In one aspect, each yoke comprises two pairs of independent arms, each pair mounted on a corresponding vertical trunk. This configuration allows even greater freedom of movement.

Suitably, in use with a large hand the vertical trunk of the yoke sits forward of the junction of finger and palm of a large hand, so that in use, the shorter fingers of a smaller hand may reach the end of the finger-receiving channels.

In one aspect, the portion of the yoke that is secured to the 'palm piece' part of the body is set back, relatively close to the wrist. This is done to provide that the palm piece itself is given its support as central to its weight as is possible, without allowing that these lowest portions of the yokes might be uncomfortable to the small hand when crushing the form so as to wring it out.

In one aspect, the yokes are produced as a single-piece having a base plate that connects them. The base plate may then be fixed to the 'palm piece' of the body.

In one particular aspect, the yokes have snap up—snap down form. This form, typically involved hinged yokes, enables a user's hand to descend vertically onto the block form body for engagement therewith rather than having to be slid into the yokes on the horizontal plane.

Suitably, a forward element of the yoke rises vertically from the body (e.g. by about 10mm) to form one half of a simple hinge. In side elevation, the working part of the yoke now forms a splayed "U" shape, with its cooperating element of the hinge at the bottom of the "U".

The hinged yoke defines two distinct positions. The first is the "at work" or "snap down" position (i.e. viewed in side elevation, the "U" is positioned with one of its arms lying flat on the base of the body and the other resembling a fixed yoke position). The second is the "waiting" or "snap up" position (i.e. the "U" form is pointing upwards).

The hand engagement action involves the user's hand descending vertically onto the hinged yoke such that the back most arm of the "U" is pressed down onto the body causing the forward arm of the "U" to close down against the back of the user's hand.

Suitably, the form and action of the yokes herein takes advantage of the natural tapering form of the user's hand.

In general terms, the side elevation taper of the user's hand is used to advantage when from its most forward point, the yoke returns back towards the wrist, in a curve that is first low to the palm for tight accommodation of a small, ladies hand's depth at junction of finger and palm, then gradually increases in height as it travels further back so that at its full height it comfortably accommodates a large, male hand's depth at this point. The form of this curve generally accommodates all of the in between hand sizes.

The form of this curve may be optimised by study of the form of the skin as it rises between the fingers. It can be seen that, at the junction of two fingers, the skin rises from its extreme forward position at palm level, and travels backwards and upwards in a gentle curve until it reaches and becomes the covering of the back of the hand.

Preferably, the interface comprises two or three resilient palm support members (e.g. yokes), each of which may comprise pairs of independent arms.

In aspects, the finger-receiving channels and/or palm support means are made from sprung steel wire or moulded (e.g. injection moulded) plastics or skinned foam.

In one aspect, the palm support means comprises a resilient framework that is arranged to carry support from the supported finger area to the palm area. Thus, as the forward portion of the body of the interface is supported so accordingly is the palm piece. The framework might be arranged so that it collapses comfortably within the hand when the interface is crushed for wringing out purposes.

In another aspect, the palm support means comprises strap (e.g. elasticised) that in use, passes over the back of the user's hand, thereby providing support to the palm of the user. The strap may be a single strap or it may comprise two or more straps arranged for

engagement. Thus the end of the straps may be provided with suitable fixing means such as buckles, hook and eye fixings (e.g. Velcro, trade name) or adhesive fixings.

In another aspect, the palm support means is provided by providing the palm piece of the body with raised parts at each side that are designed to return in so as to partially close over the back of a received user's hand. An applied strip of resilient material might alternatively provide this returning in action e.g. a plastic material). The material is suitably sprung and formed so that pressure downwards at its centre point, causes the end portions to snap and releasably lock over the back of the hand.

In one aspect herein, the foamed block form body is injection-moulded such that it has a 'skin' on part or selected parts of or its entire surface. Such a skin is readily over printed for marketing purposes.

In one aspect, the entire body is provided with a skin to enhance its resilience in general terms, and in particular to prevent drooping down of the palm piece. Such a fully skinned embodiment is particularly suitable for use with disposable wipes. By contrast, a no skin version is more suitable for use in applications where water absorption is an important factor.

Also envisaged are hybrid forms, where the body starts out fully skinned, but the skin of the base and optionally other non-hand contacting parts is removed to allow it to absorb liquid media. Such an approach may be used to provide a general mop-up product that allows a user's hand to remain dry in its use.

In one variation, the base of the body has a skin that acts to provide a waterproof layer and when used in combination with a wipe attachment serves to prevent evaporation of (e.g. cleaning) chemicals from the wipe. A skinned base also provide an ideal surface to carry, for example, a low tack adhesive for temporary securing of a wipe attachment.

The use of an injection-moulded form also enables ready chamfering of defined regions or lines on the base (e.g. at the perimeter thereof) for optimal retention of a wipe attachment.

With regard to forms of the finger-receiving channels in which the upper portion of the walls is made to close in over the top of the finger, the presence of a skin acts to ease finger

access and promote the return back of the form over the top of the finger. This is a particular benefit when it is desired that the hand be simply pressed down onto the interface in order for it to be picked up.

In embodiments herein making use of yoke elements, the yokes are suitably produced in the same injection mould process as the body and the strength of the yokes is enhanced by also providing them with a skin.

Optionally, the interface is provided with an ancillary interface such as in the form of a flexible backing sheet. This ancillary interface may be shaped and sized such as to enhance the coverage of the user's hand. The ancillary interface may also be provided with attachment means (e.g. in the form of snap-fit contourings) for attachment to the glove.

Suitably, the interface additionally comprises means to receive one or more utility attachments. As used herein, the term "utility attachments" refers to attachments having a useful function. For example, the utility attachments may take the form of tools for any useful purpose.

Suitable purposes include cleaning, washing and use in household tasks; DIY purposes including sanding, painting, shaping and forming; medical purposes; patient care purposes such as bed bathing; automotive car care including washing, polishing, leathering and interior cleaning; health and beauty purposes such as ex-foliation, massage, application of oils/lotions; gardening purposes such as house plant leaf cleaning/treatment; shoe and boot polishing; window cleaning; grooming of humans and of animals. Indeed, the interface may find utility in pretty much any and every task managed by hand.

The utility attachments may either be permanently attached to the interface or reversibly receivable by the interface. For example, the interface and utility attachment may be formed as cooperating elements, the utility attachment being interchangeable and or replaceable.

The means to receive utility attachments may comprise one or more circular recesses. These may provide the means to locate cleaning media and provide the home, for example, for bristle bunches.

Suitably, the means to receive utility attachments may comprise at least one female socket for receiving a male counterpart situated on a utility attachment.

The means to receive utility attachments are typically positioned at the underside of the block form body.

In one aspect, the releasable attachment of the utility attachment (e.g. in the form of a cloth wipe) to the body is as follows:

The periphery of the cloth wipe (e.g. shaped to cooperate with the body form) is printed with wax, or some other water repellent, to produce a flat non-cloth surface, and the cooperating periphery of the body is printed with "post-it note" (trade mark) type low tack adhesive.

Further, the wax printing on the wipe may be arranged to give it a degree of resilience / formability. This enables stamp forming of the wipe to give it an up-turned edge, so to reduce the danger of it getting caught and ripped off in use in the work situation. The up-turn is typically no more than 30 degrees, because of the need to stack the wipes. The printing/stamping may in aspects, be combined with the die cutting operation, to make it a one hit process.

As an alternative, "paper engineering" may be used as a means of fixing wipe to the body, such as of the type used in disposable nappy fixings. In aspects, the standard wipe fabric can be roughed up on one side to produce attachment loops for attachment to suitable hooks on the periphery of the underside of the body.

In aspects, the side wall (i.e. outer wall) of the block form body is provided with means for attachment of the utility attachments. In particular, variations are envisaged wherein such means are provided for attachment of a wipe (e.g. a cloth wipe) to the block form body. Such attachment provides the advantage that in use, wipe covers both the utility surface (e.g. underside) and at least part of the side wall of the block form body.

In one particular aspect, one or more attachment features defining attachment target areas are provided to the side wall of the block form body. Suitably, in use the wipe covers the base of the block form body and rises up the side walls thereof to their full height. This provides the advantage that, where the surface to which the hand-utility interface is being

applied (e.g. for cleaning thereof) alters through 90 degrees, the margin of both surfaces is cleaned.

Suitably, each attachment feature comprises a non-absorbent material having protrusions provided thereto, such that in use the wipe is mechanically (e.g. frictionally) retained by interaction with the protrusions. Suitably, the protrusions take the form of a series of teeth (i.e. not unlike the cutting edge of a saw) or a series of spikes or hooks.

In one aspect, the attachment feature takes the form of a continuous strip arranged to run along a substantial part of the side wall of the block form body. Alternatively, plural attachment features (e.g. tab form) are employed, each arranged in series fashion spaced around the wall.

Various materials may be used to form the or each attachment feature, but it is important that the material used is relatively thin and that it has a degree of pliability, so that it can not represent any danger of marking or scratching the surface to which the hand-utility surface is applied (e.g. in a cleaning operation using a wipe).

In use, the attachment feature(s) may be arranged such that the teeth-like protrusions are defined at any suitable position relative to the wall, though preferably the teeth present themselves above the upper part (i.e. that part distant from the utility surface) of the side wall.

One suitable material for use in construction of the attachment feature(s) is acetate, for example of thickness from 0.1 to 0.2mm (e.g. 0.13mm). Acetate provides the advantage that it is impervious to the moisture in the wipe.

The protrusions (e.g. teeth) may rise vertically from the attachment feature, or they may be produced at an angle thereto so that they stand proud from the side wall.

As a further alternative, static electricity may be employed as a temporary fixing means.

As a further alternative, the wipe is printed with a cling-promoting material that causes it to cling to the block form body.



The utility attachments may take the form of bristles, spines, hooks, hair, sponge, leather, fabric pads, scourers, abrasives or wire wool.

The utility attachments may also comprise vacuum elements. In one vacuum aspect, a resilient 'fish-tail' nozzle attaches to the under side of the interface. Leading therefrom a very light weight hose goes back, under the wrist and is supported mid way between wrist and elbow by a loop or hook form which goes over the arm. Suitably, a flexible membrane covers the underside of the body. Further, this flexible membrane extends to provide a "skirt" positioned outside the bristles, running around the outside of the palm and up the outside of the index and little finger, once again preventing loss of suction and promoting that the vacuum is available under the finger tip bristles. The bristle part of this particular tool is in the form of a flexible membrane with bristles lining the side of each finger and surrounding the underside of the glove. The vacuum then draws down the bristle "avenue" underneath each finger, and generally around the palm.

In another aspect, the interface incorporates means for using liquids and gasses as "tools", both flowing out through and being drawn in through attachable media. A reservoir for dispensing such gasses and or liquids may be additionally incorporated as an integral or separate, but connected, feature of the claimed invention.

In one embodiment, the utility attachments are permanently attached to the interface. In another embodiment, the utility attachments are removable and/or exchangeable.

The utility attachment is particularly suitable for use with wipes (e.g. cloth-form). The wipes may be comprised of any suitable woven or non-woven material of either natural or synthetic origin. The wipes may be used for a variety of purposes including the picking up of detritus (e.g. crumbs) from a kitchen work surface; other household uses including disinfecting, cleaning and polishing; mother and baby hygiene; hospital uses including patient hygiene and pre-operation preparation; veterinary uses including animal care in general; office and other commercial premises cleaning; automotive uses such as cleaning and polishing.

Wipes are commonly provided with a chemical formula that rapidly evaporates. In their current form, i.e. in use under the hand, the wipe is free to 'breathe' from its upper surface; accordingly its life span and performance are needlessly reduced. In aspects, the upper

surface of the wipe is provided with a waterproof membrane, so that it can't breath that way, and its in-use lifetime is improved. One approach to achieving this is to give the wipe a fixed membrane. The other approach is to give the hand-utility interface herein, a fixed membrane. The advantage of the latter being that the cost is reduced to one membrane for any number of wipes. However, if both wipe and the hand-utility interface herein had such a membrane, it might be possible to use static electricity as an alternative means of securing wipe to the interface.

The wipe used under the hand, is pressed into action only by four narrow lines (the underside of the fingers), and the periphery of the palm, this is inefficient. The wipe applied by means of the hand-utility interface herein is evenly applied over the whole of its surface. Moreover, because of the interface's ability to adapt to irregular surfaces, the performance is greatly enhanced.

Current wipes unfold to be bigger than the hand and can dry out long before it is possible, evenly to apply all of its surface to a particular wiping. This is less so for a wipe applied by the interface herein. Current wipes used directly under the hand demand that the user's hands are then washed, not so when the wipes are used with the hand-utility interface herein.

The chemicals used in current wipes have to be appropriate for direct, constant contact with the skin, and so are limited in their aggressiveness, not so where the wipes are used with the hand-utility interface herein in that the interface protects the hand from chemical contact.

Because of its moisture and rapid evaporation, the current wipe is particularly cold to the touch, less so when the wipe is used with the hand-utility interface herein which is generally dry, and warm because of its foam insulation characteristics.

Current wipe forms are typically very thin and give the user's hand little protection from the impact of surfaces encountered, not so when used with the interface herein which provides a very comfortable barrier between the hand and whatever it meets. In particular it provides a buffer for each finger tip, to absorb impact to reduce the discomfort of "stubbing". By the same means it protects the finger nails.

According to a further aspect of the present invention there is provided a hand-utility interface for use in protecting a user's hand during utility tasks comprising a foamed block body having a plurality of finger-receiving channels defined therein, wherein the finger-receiving channels snugly receive the fingers of said user's hand such that in use, the finger-receiving channels secure the interface to the user's hand.

It will be appreciated that this further aspect of the present invention represents a simplification in that distinct palm support means are not necessarily present. In use, the finger-receiving channels (alone or assisted in some other way) secure the interface to the user's hand. All other aspects of the interface, including variations thereof, are as described previously in respect of the first aspect of the present invention in which distinct palm support means are provided.

In one aspect, the block form body of the hand-utility interface is shaped to cooperate with a base station. Suitably, the base station is in this aspect provided shaped to receive the body such that, when the hand pushes the body into the base station, the interface is received in a 'parking' configuration.

In one aspect, the base station herein is integral with a container for use in containing suitable wipe attachments (e.g. a tub of wipes). For example, the interface is arranged to mate with a recessed base station within the lid of the container. Further, the container might be designed for wall mounting.

Suitably, the container for the wipes is sized and shaped to both contain a stack of wipes and such that the block form body of the may be readily brought into contact with the stack to enable ready attachment of a wipe (generally that located at the top of the stack) thereto.

In a preferred usage mode, simple pressure contact of the block form body with the stack of wipes results in co-operative attachment of a wipe thereto. In particular, this pressure contact results in suitable interaction of the wipe with one or more attachment features provided to the side wall (i.e. outer wall) of the block form body for attachment thereto.

Suitably, Velcro (trade name) strips are applied to the underside base and side walls of the block form body to assist adherence of a wipe thereto. In one suitable configuration, the

Velcro (trade name) strips run vertically up the side walls from the base. The barbs of the Velcro (trade name) may be arranged to be uni-directional (e.g. arranged to point up the side walls of the block form body so that any gravitational pull on the wipe assists to fix that wipe to the block form body. The surface of the wipe may be loose or open or rough to assist the engagement with the barbs. The angles of the barbs may be selected to optimise engagement with the wipe during the engaging movement of the block form body with the wipe.

Suitably, the container for the wipes (e.g. in tub form) is sized and shaped such that when wipes are stacked therein a portion (typically, a central portion) of each wipe adopts a flat configuration and another portion (typically, the edge portions) of each wipe adopt a standing configuration (i.e. rising up at an angle to the flat portion). Preferably, each has a bowl-like profile (i.e. flat base and rising up sides) and the wipes stack in a configuration not unlike a stack of cup cake paper containers.

Suitably, packaging is provided for separately containing a hand-utility interface and wipes for use therewith. The packaging may comprises a housing arranged to be reversible foldable from an 'unfolded' access configuration to a 'folded' storage configuration.

Suitably, the packaging housing is provided with a first recess sized and shaped to contain a stack of wipes and a second recess sized and shaped to contain a hand-utility interface.

Suitably, the wipe-containing recess has a vertical outer wall and a sloping inner wall adjacent to the fold line. The sloping inner wall is shaped to assist dragging of a wipe there over.

Suitably, the wipe-containing recess is covered by seal sheet which purpose is to prevent evaporation of the cleaning agent from the contained wipes. Suitably, the seal sheet has one edge permanently fixed to the packaging housing and its other edges reversibly fixed to the packaging housing by resealable adhesive means such that when in a sealing configuration the sheet covers the whole recess.

Suitably, the interface-containing recess has vertical walls that are roughened or abraded. Suitably, the interface-containing recess is partly of full depth and partly of progressively reducing depth.

In alternatives, the wipes may be pre-formed (e.g. moulded) to adopt a suitable profile or the forming may be *in situ*, that is to say the container itself is used to define the profile thereof. In addition, the wipes may be provided with suitable (e.g. "V-shaped") cut outs around the perimeter thereof to more readily enable the adoption of the desired profile for stacking.

In one aspect, edge portions of the wipe (which in the stacked configuration, form the rising up sides) may be loose woven to assist attachment to the attachment features, or indeed the whole wipe might be so woven.

In variations, any of the flat and/or rising up portions of the wipe may be provided with markings (e.g. colours, printed graphics or textural) to assist the user in bringing the block form body accurately into pressure contact with the wipe at the top of the stack for picking up thereof.

Suitably, each wipe is provided with a tab whose surface is dry (e.g. waxed) and such as to provide a non-cleaning agent impregnated finger hold area to the user for use in pulling a spent wipe from a hand-utility interface.

Suitably, the container for the wipes (e.g. in tub form) is arranged such that it presents a resilient surface to the bottom wipe of the stack. Suitably, the surface is of sprung plastic form. More suitably, the surface has the form of a dome in the centre of the base area of the container, which when pressed down causes arm elements which extend from the dome, to press the stack of wipes against the side walls of the block form body so pressing the wipe onto attachment features provided thereto. Suitably, the sprung element co-operates with the walls of the container in order to perform this assisted attachment operation.

In another aspect, the invention provides a kit of parts comprising a hand-utility interface as defined *supra* and a set of utility attachments as defined *supra*. Optionally, the kit of parts further comprises a base station for said interface.

### Brief description of the drawings

The invention will now be described further with reference to the accompanying drawings, in which:-

Figure 1 shows a plan view of a hand-utility interface in combination with a wipe attachment in accord with one aspect of the present invention;

Figure 2 shows a plan view of a block form body for use with the interface of Figure 1 in the absence of palm support means;

Figure 3 shows a plan view of a second hand-utility interface glove in accord with another aspect of the present invention;

Figure 4 shows a plan view of a third hand-utility interface in combination with a wipe attachment in accord with one aspect of the present invention;

Figure 5a shows a plan view from above of packaging for containing a hand-utility interface and wipes in accord with one aspect of the present invention and Figure 5b shows the packaging of Figure 5a in cross-sectional view, the cross-section taken along the line X-X' of Figure 5a;

Figures 6a and 6b show a hinged yoke for use with the interface herein in respective 'lock down' and 'lock up' positions.

Figure 7a shows a sectional view of a block form body provided with finger grips in the 'grips open' position and Figure 7b shows a top view of a detail of the block form body of Figure 7a with the finger grips in the 'grips closed' position;

Figure 8 shows a top view of a block form body herein with crushable horseshoe band provided at the finger tip region;

Figure 9a shows a side view of a hand-cloth interface for use with a cleaning cloth aspect of the present invention and Figure 9b shows a top cross-sectional view of the hand-cloth

interface of Figure 9a shown along the cross-section defined by line A-A' of Figure 9a and Figure 9c shows a back end elevation of the second hand-cloth interface of Figure 9a and Figure 9d shows palm support means suitable for use in the second hand-cloth interface of Figure 9a;

Figure 10 shows a side view of a cleaning cloth aspect of the present invention; and

Figure 11 shows a plan view of a second cleaning cloth aspect of the present invention;

Referring now to the drawings, Figure 1 illustrates a hand-utility interface herein 102 herein arranged to mate with a wipe attachment 150 therefor.

The interface 102 has block form body 110 injection-moulded from a polymeric foam material. The body 110 is shaped to receive in use, the palm and fingers of a user and is provided with a palm-receiving portion 112 having a gently domed surface to mirror the surface of a received user's palm and four elongate U-shaped finger-receiving channels 114a-d. The finger-receiving channels 114a-d may be seen to be defined by two outer walls 116a-b and three inner dividing walls 117a-c, which stand proud from the base 104 of the interface 102. The tip ends 118a,c-d of the index, third and fourth fingers of the body 110 may be seen to define a generally soft, rounded profile whereas that tip end 118b of the second (i.e. longest) finger has a generally 90° (right angled) profile. This form of profile eases the insertion of the second finger tip end 118b into corners for cleaning such as for example, where the interface is used for window cleaning. The finger tip ends 118a, 118c of the body 110 for the index and third fingers are suitably arranged to crush down, thereby providing an improved profile for sweeping a window frame immediately adjacent to the glass.

The body is further provided with resilient yokes 130a, 130b each comprising a bobbled end 132a, 132b. In use, the yokes 130a, 130b respectively bridge the node between a user's first and second, and third and fourth fingers, the bobbled end 132a-b engaging the top of the user's hand, such that the palm of the user's hand is retained adjacent to the palm-receiving portion 112 of the body 110.

In use, the finger channels 114a-d and the yokes 130a-b in combination, form the means to retain the interface on the user's hand. The user inserts a finger into each respective finger-receiving channel 114a-d where each finger is snugly received. The snug receipt is assisted by the resilience of the foam material comprising the body 110 which mean that the relevant walls 116a-b, 117a-c of each finger-receiving channel tend to give as a finger is inserted and naturally adapt to any further finger movement to maintain snug finger-receipt. In a usage operation, the user's fingers grip the divider walls 117a-c of the finger-receiving channels 114a-d, thereby retaining the finger-receiving part of the body 110 adjacent to the fingers. Meanwhile, the yokes 130a, 130b engage the node between the user's first and second, and third and fourth fingers such as to retain the palm of the user's hand adjacent to the palm-receiving portion 112 of the body 110.

The independent flexing of each of the finger-receiving channel 114a-d and yoke elements 130a-b contributes to the ability of the glove to both protect the user's palm and fingers without hampering the movement of the user's hand and fingers.

The underside base 104 of the interface 102 has a uniform flat surface (not visible) that is shaped to receive a utility attachment in the form of a wipe 150. Suitable means (e.g. as described hereinbefore) may be provided to fix the wipe 150 to the base of the interface 102. The wipe 150 is suitably provided with cleaning media (e.g. detergent).

Figure 2 shows a plan view of the body 110 only of the interface 102 of Figure 1. Suitable dimensions of each element are indicated.

Figure 3 shows a variation of the interface 102 of Figure 1, which is identical in all aspects other than the form of the yokes 130a-b.

In more detail, the interface 202 has block form body 210 injection-moulded from a polymeric foam material. The body 210 is shaped to receive in use, the palm and fingers of a user and is provided with a palm-receiving portion 212 having a gently domed surface to mirror the surface of a received user's palm and four elongate U-shaped finger-receiving channels 214a-d. The finger-receiving channels 214a-d may be seen to be defined by two outer walls 216a-b and three inner dividing walls 217a-c, which stand proud from the base 204 of the interface 202. The tip ends 218a,c-d of the index, third and fourth fingers of the body 210



may be seen to define a generally soft, rounded profile whereas that tip end 218b of the second (i.e. longest) finger has a generally 90° (right angled) profile. This form of profile eases the insertion of the second finger tip end 218b into corners for cleaning.

The body is further provided with resilient yokes 230a, 230b each comprising a mushroomed end 232a, 232b. In use, the yokes 230a, 230b respectively bridge the node between a user's first and second, and third and fourth fingers, the mushroomed end 232a-b engaging the top of the user's hand, such that the palm of the user's hand is retained adjacent to the palm-receiving portion 212 of the body 210.

In use, the finger channels 214a-d and the yokes 230a-b in combination, form the means to retain the interface on the user's hand. The user inserts a finger into each respective finger-receiving channel 214a-d where each finger is snugly received. The snug receipt is assisted by the resilience of the foam material comprising the body 210 which mean that the relevant walls 216a-b, 217a-c of each finger-receiving channel tend to give as a finger is inserted and naturally adapt to any further finger movement to maintain snug finger-receipt. In a usage operation, the user's fingers grip the divider walls 217a-c of the finger-receiving channels 214a-d, thereby retaining the finger-receiving part of the body 210 adjacent to the fingers.

Meanwhile, the yokes 230a-b engage the node between the user's first and second, and third and fourth fingers such as to retain the palm of the user's hand adjacent to the palm-receiving portion 212 of the body 210.

The independent flexing of each of the finger-receiving channel 214a-d and yoke elements 230a-b contributes to the ability of the glove to both protect the user's palm and fingers without hampering the movement of the user's hand and fingers.

The underside base 204 of the interface 202 has a uniform flat surface (not visible) that is shaped to receive a utility attachment in the form of a wipe 250. Suitable means (e.g. as described hereinbefore) may be provided to fix the wipe 250 to the base of the interface 202. The wipe 250 is suitably provided with cleaning media (e.g. detergent).

Whilst the block form body of Figure 2 is described above as a body 110 component of the interface of Figure 1 (which also comprises yoke form palm support means), embodiments

are envisaged herein in which no palm support means are present. Such embodiments may be derived from the basic body form shown in Figure 2 by for example, raising the height of the relevant walls 117a-c of the finger-receiving channels 114a-d or otherwise modifying such finger-receiving channels in accord with any variations set out in the description herein to provide sufficiently retaining finger support means that no distinct palm support means are required to support the user's hand, in use.

Figure 4 illustrates a further hand-utility interface herein 302 herein arranged to mate with a wipe attachment 350 therefor.

The interface 302 has block form body 310 injection-moulded from a polymeric foam material. The body 310 is shaped to receive in use, the palm and fingers of a user and is provided with a palm-receiving portion 312 having a gently domed surface to mirror the surface of a received user's palm and four elongate U-shaped finger-receiving channels 314a-d. The finger-receiving channels 314a-d may be seen to be defined by two outer walls 316a-b and three inner dividing walls 317a-c, which stand proud from the base 304 of the interface 302. The thickness of the walls 316a-b, 317a-c is suitably selected to be sufficient such that the interface 302 deforms relatively little even when pressure is applied by the user's hand. The tip ends 318a,c-d of the index, third and fourth fingers of the body 310 may be seen to define a generally soft, rounded profile whereas that tip end 318b of the second (i.e. longest) finger has a generally 90° (right angled) profile. This form of profile eases the insertion of the second finger tip end 318b into corners for cleaning such as for example, where the interface is used for window cleaning. The finger tip ends 318a, 318c of the body 310 for the index and third fingers are suitably arranged to crush down, thereby providing an improved profile for sweeping a window frame immediately adjacent to the glass.

The body is further provided with resilient yokes 330a, 330b each comprising a bobbled end 332a, 332b. In use, the yokes 330a, 330b respectively bridge the node between a user's first and second, and third and fourth fingers, the bobbled end 332a-b engaging the top of the user's hand, such that the palm of the user's hand is retained adjacent to the palm-receiving portion 312 of the body 310.

In a variation of the interface of Figure 4, the two yokes 330a, 330b are produced as a single-piece moulding having a base plate that connects them. The base plate may then be fixed to the upper surface 312 of the interface 302.

In use, the finger channels 314a-d and the yokes 330a-b in combination, form the means to retain the interface on the user's hand. The user inserts a finger into each respective finger-receiving channel 314a-d where each finger is snugly received. The snug receipt is assisted by the resilience of the foam material comprising the body 310 which mean that the relevant walls 316a-b, 317a-c of each finger-receiving channel tend to give as a finger is inserted and naturally adapt to any further finger movement to maintain snug finger-receipt. In a usage operation, the user's fingers grip the divider walls 317a-c of the finger-receiving channels 314a-d, thereby retaining the finger-receiving part of the body 310 adjacent to the fingers. Meanwhile, the yokes 330a, 330b engage the node between the user's first and second, and third and fourth fingers such as to retain the palm of the user's hand adjacent to the palm-receiving portion 312 of the body 310.

The independent flexing of each of the finger-receiving channel 314a-d and yoke elements 330a-b contributes to the ability of the glove to both protect the user's palm and fingers without hampering the movement of the user's hand and fingers.

The underside base 304 of the interface 302 has a uniform flat surface (not visible) that is shaped to receive a utility attachment in the form of a wipe 350. Attachment means are provided to fix the wipe 350 to the interface 302. In more detail, the attachment means comprise three pairs of attachment tabs 340a-f, each comprising non-absorbent material and provided with a toothed upper edge 342a-f. Two pairs of tabs 340a-b, e-f are arranged on the side walls 316a, 316b of the block form body and the other pair of tabs 340c-d arranged at the leading end of the body 302 on either side of 90° tip end 318b.

The wipe 350 is seen to have a shape defining generally upturned edges 352. It may be appreciated that the overall wipe 350 profile is arranged such that when the body 302 is pressed onto the wipe 350 the upturned edges 352 thereof tend to ride up the side walls 316a-b and tip end 318b portion of the body to contact the attachment tabs 340a-f. Attachment of wipe 350 to body 302 occurs when the edges 352 of the wipe 350 are

retained by the toothed upper edge 342a-f of each attachment tab 340a-f. In use, the wipe 350 is suitably provided with cleaning media (e.g. detergent).

In one variation of the utility attachment shown in Figure 4, the wipe 350 is provided as the leading wipe of a stack of wipes container within a tub-form container. The profile of the tub is further arranged such that when the body 302 is pressed onto the wipe 350, the stack is depressed and the sides of the tub act on the wipe 350 to urge its edges 352 towards the attachment tabs 340a-f on the body.

Figures 5a and 5b show packaging 460 suitable for separately containing a hand-utility interface (not shown) and wipes 450 for use therewith. The packaging may be configured to accommodate any particular hand-utility interface including one that has 'ambidextrous' form (i.e. suitable for wearing on either hand of the user).

In more detail, the packaging 460 comprises a vacuum-formed tray 462 arranged to be reversible foldable in half about fold line 461 from an 'unfolded' access configuration (as shown) to a 'folded' storage configuration. The left-hand (as shown) part of the tray 462 is provided with a first recess 464 sized and shaped to contain a stack of wipes 450 impregnated with cleaning agent. The wipe-containing recess 464 has a vertical outer wall 465 (i.e. perpendicular to the plane defined by the tray 462) and a sloping inner wall 466 adjacent to the fold line 461. The sloping inner wall 466 is shaped to assist dragging of a wipe 450 there over. The right-hand (as shown) part of the tray 462 is provided with a second recess 468 sized and shaped to contain a hand-utility interface (not shown) herein, which for example, may have a form similar to that shown in Figure 4.

The vertical walls 469a, 469b of the interface-containing recess 468 are roughened or abraded for a purpose that will be described later. The interface-containing recess 468 is of full depth from that part of the recess extending from where line X-X' intersects to its forward pointed end 467a but then tapers to progressively lower depth towards its half-moon shaped rear end 467b. This tapering ensures that a user's wrist will not adversely impact on the walls 469a, 469b of the recess 468 when a user's hand is inserted therein.

The wipe-containing recess 464 is covered by plastic seal sheet 470 whose purpose is to prevent evaporation of the cleaning agent from the wipes 450. The seal sheet 470 has one

edge permanently fixed to the left-hand, outer edge 472 of the tray 462 and its other edges reversibly fixed to the tray 464 by resealable adhesive trace-line 474 to such that when in a sealing configuration the sheet 470 covers the whole recess 464.

The top surface of each wipe 450 may be seen to be printed with a target area 454 corresponding to the outer profile of the hand-utility interface (not shown) to which it is to be attached. V-cuts 456a-c are provided to each wipe 450 at first to third angular corners 457a-c thereof. The v-cuts 456a-c act such as to assist fixing of the wipe 450 a suitable hand-utility interface by relieving the resistance of the wipe 450 to becoming fixed thereto, which may otherwise arise due to the need to fold the wipe at its corners 457a-c. Each wipe 450 is also provided with a tab 458 whose surface is dry (e.g. waxed) and such as to provide a non-cleaning agent impregnated finger hold area to the user for use in pulling a spent wipe 450 from a hand-utility interface.

The packaging 460 of Figures 5a and 5b is for example, suitable for use with a hand-utility interface of the general form as shown in Figure 4. In variations, of the interface 302 of Figure 4 Velcro (trade name) strips may be applied to the underside base 304 and side walls 316a-c of the interface 302 to assist adherence of a wipe 350, 450 thereto. In one configuration, the Velcro (trade name) strips run vertically up the side walls 316a-c from the base 304. The barbs of the Velcro (trade name) may be arranged to be uni-directional (e.g. arranged to point up the side walls 316a-c of the interface 302 so that any gravitational pull on the wipe 350, 450 assists to fix that wipe 350, 450 to the interface 302. The surface of the wipe 350, 450 may be loose or open or rough to assist the engagement with the barbs. The angles of the barbs may be selected to optimise engagement with the wipe 450 during the engaging movement of the interface with the wipe 450.

In a typical usage operation of the packaging of Figures 5a and 5b, the pack 460 is unfolded about fold line 461 from its storage configuration to its access configuration. The user applies the interface (not shown) stowed in recess 468 to their hand such that the interface is worn by the user's hand. The interface is then removed from the recess 468 under the control of the user's hand by lifting or sliding it out of the recess 468.

Seal sheet 470 is then peeled away to uncover the stack of wipes 450. The underside of the interface is then applied with light pressure to the target area 454 of the top wipe 450 of the

stack causing the wipe 450 to lightly adhere to the interface. That wipe 450 is then dragged over incline 466 from the wipe-containing recess 464 to the second recess 468. Greater downward pressure is then applied by the user's hand to the interface and wipe 450 within the recess 468 resulting in firm adherence of the wipe 450 to interface. The tapered nature of the recess 468 ensures that the user's wrist will not adversely interact with the walls 469a, 469b of the recess 468 during this pressing down action. The roughened or abraded nature of the vertical walls 469a, 469b of the recess 468 assist in fixing the wipe 450 to the interface (e.g. by assisting to drive the barbs of a Velcro (trade name) strip into the wipe 450). Typically, the edges 452 of the wipe 450 will ride up the side walls (e.g. side walls 316a-c of Figure 4) of the interface and be gripped by grip features (e.g. attachment tabs 340a-f of Figure 4) of the interface. Cleaning operations may then be performed with the firmly-adhered wipe 450, which is removed after use by the taking grip of the spent wipe by dry tab 458 and ripping it from the interface.

Figures 6a and 6b show sectional views of a hinged yoke for use with the interface herein in respective 'lock down' and 'lock up' positions.

Base 535 of first part 534 of hinged yoke 530 seats on block form body 502. Rising mast 533 of the first yoke part 534 projects away from the block form body 502 to hinge point 537 at which second "U" shaped part 536 of the hinged yoke 530 hingedly connects thereto.

It may be seen that the hinged yoke 530 defines two distinct positions. The first shown in Figure 6a is the "at work" or "snap down" position (i.e. viewed in side elevation, the "U" shaped part 536 is positioned with one of its arms lying flat on the base of the body and the other resembling a fixed yoke position). The second shown in Figure 6b is the "waiting" or "snap up" position (i.e. the "U" shaped part 536 is pointing upwards).

Engagement of the user's hand with the hinged yoke 530 involves a user's hand descending vertically onto the hinged yoke 530 when in the "waiting" or "snap up" position such that the back most arm of the "U" part 536 is pressed down onto the body 502 causing the forward arm of the "U" part 536 to close down against the back of the user's hand.

Figure 7a shows a view of a block form body 602 provided with finger grips 680, 682 in the 'grips open' position. Figure 7b shows a top view of a detail of the block form body 602 of Figure 7a with the finger grips 680, 682 in the 'grips closed' position.

Block form body 602 has plural finger-receiving channels 614a-d provided thereto. As shown, the third 614c and fourth 614d finger-receiving channels have flexible finger grips 680c, 680d provided thereto. Each finger grip 680c, 680d fits within a recess 682c, 682d provided to the base 615c, 615d and relevant walls 616b, 617b-c of each finger-receiving channel 614c, 614d.

In use, the finger grips 680c, 680d function to grip the relevant finger of a user's hand, thereby securing the fingers (and hand) to the block form body 602. With finger grips 680c, 680d in place, a user's hand may simply descend vertically onto and pick up the block form body 602, making it a true "one-hand" pick up.

Figure 8 shows a top view of a block form body 702 suitable for ambidextrous use herein with a crushable band 790 provided at the finger tip region.

In more detail, foamed block form body 702 is shaped to provide plural finger-receiving channels 714a-d defined by respective side 716a-b and divider walls 717a-c. It may be noted that the block 702 has generally symmetric form such that first 714a and fourth 714d finger-receiving channels mirror each other in form as do the second 714b and third 714c finger-receiving channels. This is deliberate since it is intended that the block form body 702 may form part of an interface to be worn on either hand of the user.

The applicant has however, noted that there can be a problem with such a symmetric (i.e. ambidextrous) form of the block form body. In use, neither the third or fourth fingers of the user fully reach the end of their respective finger-receiving channels, for either the left or the right hand. In effect, the vacant space in the relevant finger-receiving channel moves from the right hand side of the block form body to the left hand side, depending upon which hand is applied.

The block form body 702 of Figure 8 is thus provided with a crushable band 790 extending across the tips of each finger-receiving channel 714a-d. The band 790 is resiliently

crushable in form, for example comprising a soft-walled fluid-filled sack. In use, when a user's fingers are inserted into the finger-receiving channels 714a-d the band 790 crushes, thereby resulting in filling up of the otherwise vacant channel 714a-d space by the band 790.

In another aspect herein, the hand-utility interface is suitable for use with a self-disinfecting cloth or cloth with visual warning feature to show when disinfectant components thereof are exhausted. The cloth might be a permanent fixture attached to the interface, or it might be a separate and replaceable feature. In either case, the interface will typically be provided vertical apertures in the finger channels and in the 'palm piece' part of the body, through which the "pockets" of disinfectant will be clearly visible before the hand is inserted.

According to another aspect of the present invention there is provided a multi-layer form cleaning cloth comprising

- (a) an absorbent cloth layer;
- (b) adjacent to said absorbent cloth layer, a perforate layer comprising at least partly non-transparent material; and
- (c) adjacent to said perforate layer, a fluid impermeable layer comprising at least partly a transparent material, said fluid impermeable layer joining to said perforate layer such that a reservoir for receipt of cleaning media is defined,

wherein the non-transparent perforate layer is visible through the transparent liquid impermeable layer when the reservoir is empty of cleaning media.

The cleaning cloth herein has a multi-layer form. That is to say, it comprises multiple layers of material, the characteristics of which in combination define the functionality of the cleaning cloth.

The cleaning cloth comprises an absorbent cloth layer. The cloth layer may comprise either woven or non-woven cloth material of either synthetic or natural origin.



The cloth layer acts as the 'business end' of the cleaning cloth herein. That is to say, it is the part of the cloth that is directly used to contact surfaces to be cleaned when employed in cleaning operations herein.

Adjacent to the absorbent cloth layer, there is provided a perforate (or part-fluid permeable) layer. The perforate layer may be in the form of a membrane. Suitably the perforate layer permits only one-way passage of cleaning media. That is to say, it permits passage of cleaning media from the reservoir to the absorbent cloth but not in the reverse direction. The perforate layer is typically in joined or at least, in contacting relationship with the absorbent cloth.

The perforate layer comprises at least partly non-transparent material. In one aspect, the perforate layer comprises coloured material. In another aspect, the perforate layer comprises visible markings such as defined indicia (e.g. words or symbols or a repeating pattern thereof).

Adjacent to the perforate layer, there is provided a fluid impermeable layer. The fluid impermeable layer comprises at least partly a transparent material (e.g. formed of clear polythene). The fluid impermeable layer joins to the perforate layer such that a reservoir (e.g. pocket) for receipt of cleaning media is defined therebetween.

In use, the reservoir is provided with cleaning media (e.g. detergent or disinfectant), generally in fluid, gel or water-soluble solid form. The cleaning media is visible to the user through the transparent part of the fluid impermeable layer. In aspects, the cleaning media is coloured such as to enhance its visibility in the reservoir.

In one aspect, the cleaning media is over-printed onto the perforate layer such as in a layer of about 1mm thick. The fluid impermeable layer is then applied over this printed layer and edge-seals formed to provide a sealed reservoir volume.

In accord with the invention however, such cleaning media blocks or otherwise compromises the user's view of the non-transparent perforate layer. The non-transparent perforate layer is visible through the transparent liquid impermeable layer only when the reservoir is essentially empty of (i.e. depleted of) cleaning media.

In use, the cleaning cloth is designed such that cleaning media gradually travels (e.g. as a result of applied pressure or osmosis) from the reservoir through the perforate layer to the absorbent layer where it is used for cleaning purposes. The reservoir therefore becomes progressively depleted of cleaning media until such a point as it is empty, or at least essentially empty for all practical purposes. It is at this point, that the non-transparent perforate layer becomes visible to the user, thereby providing an alert that the cleaning media reservoir has become depleted.

In one particular aspect herein, a layer of domestic or other cleaning cloth, has welded to it a repeating pattern of small circles (or other shapes) so that the circles are evenly spaced east/west and north/south on the cloth. The circles are formed of a very thin layer polythene or other impervious but highly flexible material. These circular membranes are arranged to show a colour, most likely red. These circles of red membrane have one or more perforations.

By a further process, the circles are "over printed" with a semi solid or gel type disinfectant. This disinfectant layer might typically be 1.00mm thick. The disinfectant is water-soluble and it is coloured, perhaps yellow.

By a further process a transparent waterproof membrane is applied to cover all of the circles and the whole of this side of the cloth. This sheet membrane is welded to both the cloth, between the circles, and to the perimeter only of each circle, so that the disinfectant is contained within cells or pockets.

With the cloth dampened, and flexed in work, moisture will pass through the perforations in the red circular membranes and dissolve a portion of the semi-solid disinfectant, with further flexing the now liquid portion of the disinfectant will leak into the fabric of the cloth, so maintaining it safe and hygienic.

Gradually, through work, the cells will empty until there is no yellow disinfectant left. So, at this point, when the cloth has reached the end of its hygienic life, a colour change will be apparent to the user, where before the cloth had yellow circles, it now has red circles - warning of its imminent descent into an unhygienic state.

The cleaning cloth aspect herein is suitable for use with any hand-utility interface including the interface having the foamed block form body, as described hereinbefore. Where the interface comprises a block form body one or more apertures are suitably provided to that body to enable the transparent 'viewing window' to be made visible to the user. The cleaning cloth is also suitable for use with the hand-utility interface described in applicant's copending PCT patent application no. WO 02/087406.

Figure 10 illustrates a cleaning cloth 50 herein. The cloth comprises a bottom sheet 52 in the form of an absorbent cloth layer (e.g. formed from a suitable woven or non-woven material). Adjacent to the absorbent cloth layer 52, there is provided a perforate layer 54 comprising coloured (e.g. red) material. In aspects, the perforate layer 54 may be provided with suitable markings (e.g. indicia of any suitable form). Adjacent to the perforate layer, there is provided a top sheet 56 in the form of a fluid impermeable layer comprising a transparent material. The fluid impermeable layer 56 joins to said the perforate layer 54 and absorbent cloth layer 52 at respective joins 58 and 57. A reservoir 60 for receipt of cleaning media is defined between the fluid impermeable layer 56 and the perforate layer 54. The reservoir 60 is provided with coloured (e.g. green) liquid detergent 62.

When the reservoir 60 is full, the detergent 62 content thereof is visible to the user through the transparent liquid impermeable layer 56. The coloured perforate layer 54 is however, at least partly obscured from view by the presence of the detergent. In use, however as detergent 62 is supplied to the absorbent cloth 52 through the perforate layer the amount of obscuring detergent 62 in the reservoir is reduced. When the reservoir 60 is empty of detergent, the coloured perforate layer 54 becomes clearly visible through the transparent liquid impermeable layer 56 and this acts as a signal to the user that the reservoir 60 is empty and therefore that another cleaning cloth 50 must be selected to continue with the cleaning operation.

Figure 11 illustrates a top view of a second cleaning cloth 250 herein that is shaped for particular use with the hand-cloth interface of Figures 9a-9d. The liquid impermeable, transparent top sheet 256 of the cloth 250 is shaped to mirror that of the underside of the body 101 of the interface (e.g. as shown in Figure 9b) to which it is applied in mating contact. Plural reservoirs 260a-e are provided to the cloth 250 and visible through top sheet 256. Reservoirs 260a-d correspond to finger contact locations and reservoir 260e to a palm

location. The overall layer structure of the cleaning cloth 250 corresponds closely to that of Figure 10.

As shown, the cloth 250 of Figure 11 is partly depleted of cleaning media. Detergent 262 is visible in the palm reservoir 260e, but the indicia 255 'EMPTY' which is printed on the perforate layer 254 is visible in the finger reservoirs 260a-d thereby serving to indicate that these reservoirs have been emptied of detergent and that another cloth 250 should be selected.

Figures 9a-9c illustrate a hand-cloth interface 102 suitable for use with the cleaning cloth herein and Figure 6d illustrates palm support means 106a, 106b suitable for use with the hand-cloth interface of Figures 9a-9c. Each finger portion 110a-110d of the hand-cloth interface 102 is provided with a finger grip 104a-104d in the form of a cage, which surrounds the end of a user's finger and each of which is provided with a thimble-like end 112a-112d. Each finger 110a-110d of the hand-cloth interface 102 is also provided with an inwardly tapering constriction 105a-105d located at a point below the foremost portion of the finger tip cage 104a-104d, which in use, corresponds approximately to a point below the first joint of the user's finger. The gripping portion of the finger tip cage 104a-d (i.e. that which acts on the constriction 105a-d) is that part interior to the lug 148, as shown in Figure 9a. The gripping point will differ for different user hand sizes. On a small hand, the constriction 105a-105d locates more or less central to the first and second finger joints; on a large hand the constriction 105a-105d locates just behind the first finger joint. It may be appreciated that in use, both the finger grip framework 104a-104d and the constriction 105a-105d act such as to retain the user's finger within the hand-cloth interface.

The hand-cloth interface 102 is also provided with T-form yokes 106a, 106b each comprising pairs of gripping arms 132a, 132b and 132c, 132d (shown in outline in Figure 9a). The form of the T-form yokes 106a, 106b may be better understood by reference to Figure 9d from which it may be appreciated that each gripping arm 132a-132d is independently movable. Indeed, each yoke 106a, 106b is comprised of two separate arm 132a, 132c and 132b, 132d; trunk 134a, 134c and 134b, 134d; and base 136a, 136c and 136b, 136d elements. In use, the T-forms yokes 106a, 106b respectively engage the node between a user's first and second, and third and fourth fingers.

In tandem, the finger grips 104a-104d and T-form yokes 106a, 106b form the means to retain the hand-cloth interface on the user's hand. The independent movability of each of these elements, in turn contributes to the ability of the hand-cloth interface to both protect the user's palm and fingers without hampering the movement of the user's hand and fingers.

The underside base 101 of the hand-cloth interface 102 is formed from a flexible, but resilient material (e.g. foam). The base 101 is provided with various shape characteristics to maximise its flexibility. These comprise longitudinal cutaway portions 140 (one only labelled, for clarity) in the palm of base 101; diamond-shaped extensible portions 142 (again, one only labelled) at the palm-end of each finger portion 110a-110d, which provide flexibility in accommodating an unusually long user's finger; and "v"-shaped incisions 114 (one labelled only) running transversely across the underside of each finger portion 110a-110d of the hand-cloth interface 102, which enables ready finger movement.

In the at rest mode, the base 101 of the hand-cloth interface 102 has a uniform flat profile and is therefore ideally shaped to receive a cleaning cloth as described herein. The base 101 is further provided with wall 146, which assists the stability of the interface 102 on the user's hand when in use. Each finger grip 104a-d is further provided with substantially triangular-shaped lug 148 (one only shown, for clarity) for use in mounting the hand-cloth interface 102 to a base station or housing.

In use, base 101 of the hand-cloth interface 102 is designed to cover at least that part of a user's palm that can be comfortably reached by the user's fingers once they are curled over. This ensures that an attached cleaning cloth can be efficiently wrung out by a simple clenching of the user's fist.

In still further aspects herein there is provided a 'free breathing glove'. This is a full glove that is typically water proof and/or chemical proof and supported on the hand by an interface comprising finger tip grips and yokes. The advantage is that the upper skin of the glove need not touch the hand at all, and so a clear air passage can be provided to allow the hand to breath. In developments of the 'free breathing glove' a natural bellows effect can be set up, so that articulation of the hand in work will automatically exchange the air thereby functioning as an 'excess heat dissipater'.

In still further aspects, the interface is provided with a 'sure grip' feature. This enables the interface to function as a means of giving an operative a better grip on tools and the materials of work in general. This application can be provided in two forms: one is the format of the interface worn regularly as a glove type. The second is the interface being built into work tools, both powered and non powered.

In still further aspects, the interface is provided as a means of isolating the hand from the vibration of equipment in general. In a particular aspect, the interface is provided as a means of easing the pressures that contribute to repetitive stress injury (RSI).

In still further aspects, the interface is used to provide a perfect framework for the hand application of abrasive papers and such as the "Scotch Bright" (trade mark) type format. These abrasives may for example be used for the automotive, aircraft, carpentry and DIY sectors.